

ABSTRACT

Novel processes for the production of polyolefins, other polymers, and oxygenated compounds, such as polypropylene, polyethylene, polybutene-1, poly(isobutylene), polystyrene, poly(1,3-butadiene), ethylene oxide, propylene oxide, acrylonitrile, acrolein and others, within gas phase and slurry phase type reactors, from olefins produced via the catalytic dehydrogenation of corresponding paraffins and other monomers inside permeable catalytic membrane reactors or non-permeable conventional reactors. The developed processes can produce both homopolymers and copolymers depending on the operating conditions of the preceding dehydrogenation permreactor. The invented processes utilize integrated separation, recycling and re-reaction operations of the unconverted olefins, paraffins and other utilized monomers and hydrocarbon molecules. Product hydrogen from the dehydrogenation reactions can be fed directly into the polymerization reactors as a chain transfer agent to adjust the molecular weight and structure of the produced polyolefins and other polymers. Moreover, integrated olefin-paraffin membrane separators and fluid bed polymerization reactors for conversion of olefins to polyolefins are invented. Also, integrated dehydrogenation permreactors (membrane based reactors) and fluid bed polymerization reactors are invented which finally produce polyolefins from paraffin feed within a single module. These last integrated reactors can be also used for production of other final polymers through combined dehydrogenation-polymerization, such as polystyrene and poly(1,3-butadiene).